

LAGOPHYLLA DIABOLENSIS (COMPOSITAE–MADIINAE), A NEW HARE-LEAF FROM THE SOUTHERN DIABLO RANGE, CALIFORNIA

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ABSTRACT

Lagophylla diabolensis is a new hare-leaf from the southern Diablo Range of Fresno, Monterey, and San Benito counties, California. Plants of the Diablo Range hare-leaf were previously included within *L. dichotoma*, which is treated here in a restricted sense to comprise plants from the Sierra Nevada foothills and eastern Great Central Valley. *Lagophylla diabolensis* differs morphologically from *L. dichotoma* by having consistently glandular distal foliage (glands clear to dark-purple), narrower cauline leaves, generally uniformly tawny stems, and smaller heads. The taxonomic significance of those morphological differences is corroborated by other evidence that *L. diabolensis* is more closely related to the widespread *L. ramosissima* than to *L. dichotoma sensu stricto*. The Diablo Range hare-leaf occurs as scattered colonies, often in clayey soils of grassy openings in oak-pine woodland below 1100 m elevation. Extreme rarity and paucity of recent collections of *L. diabolensis* and *L. dichotoma* in the current sense indicates that both species warrant conservation concern.

Key Words: Asteraceae, California flora, *Lagophylla diabolensis*, *Lagophylla dichotoma*, Madieae, Madiinae, new species, tarweed.

Lagophylla Nutt. (Compositae–Madiinae) is a tarweed genus of spring- and summer–fall-flowering annuals commonly called hare-leaves, for the soft-hairy (hare’s fur-textured) leaves of the type species, *L. ramosissima* Nutt. Hare-leaves represent a well-supported, diploid ($x = 7$) clade of the “*Layia* lineage” (Baldwin 2003) and share with *Layia* the characteristic of obcompressed ray cypselae that are each completely enwrapped by a phyllary. Thompson (1983), who conducted biosystematic and cytogenetic studies of *Lagophylla*, and most subsequent authors (e.g., Keil 1993; Baldwin 2012) have recognized four species of hare-leaves, one of which (*L. ramosissima*, including *L. congesta* Greene) is self-compatible and widespread from western and northeastern California to central Washington, western Idaho, and northern Nevada. The other three species [*L. dichotoma* Benth., *L. glandulosa* A. Gray, and *L. minor* (D. D. Keck) D. D. Keck] are relatively showy, self-incompatible or pseudo-self-compatible taxa that are endemic to California and the California Floristic Province, with distributions that are non-overlapping or nearly so (Thompson 1983).

Taxonomic and floristic accounts of *Lagophylla* reflect long-standing confusion about the relationships and distributions of the showy, strongly self-incompatible, and spring–early-summer-flowering members of the genus, which were initially all treated as *L. dichotoma*. Bentham (1849) described *L. dichotoma* from an 1847 collection by Hartweg, reportedly from pastureland in the Sacramento Valley. Based on collections by Hartweg, Bigelow, and Fitch, Gray

(1880) indicated the distribution of *L. dichotoma* as being from “(p)lains of the Sacramento and Feather Rivers,” in the Sacramento Valley. Jepson (1925) noted a broader distribution of *L. dichotoma* from “(s)lopes of mtns. bordering or near the Sacramento Valley,” in the northern Sierra Nevada foothills and the Inner North Coast Ranges. Keck (1935) recognized that the showy, spring-flowering, serpentine-dwelling populations of the northern Sierra Nevada foothills and Inner North Coast Ranges, included in Jepson’s circumscription of *L. dichotoma*, warranted recognition as a distinct taxon, *L. dichotoma* subsp. *minor* D. D. Keck, which he later elevated to species rank (Keck 1958) as *L. minor*. Keck’s (1959) revised concept of *L. dichotoma* (= *L. dichotoma* subsp. *dichotoma* [Keck 1935]) included spring–early-summer-flowering, mostly non-serpentine populations with broader and duller ray cypselae, shorter-haired phyllaries, and stricter habits, with a less open branching pattern. *Lagophylla dichotoma sensu* Keck (1959) comprised a set of populations from the Great Central Valley and adjacent Sierra Nevada foothills and a disjunct, western set of populations in the southern Diablo Range, of the Inner South Coast Ranges. Keck’s (1959) circumscription of *L. dichotoma* was adopted by authors of subsequent floristic treatments (e.g., Keil 1993; Baldwin 2012) and by Thompson (1983), who was able to include only one population (from the Diablo Range) in his biosystematic and cytogenetic study of *Lagophylla*.

Morphological differences between populations of *L. dichotoma sensu* Keck (1959) in the

Diablo Range and those to the east, in the Great Central Valley and Sierran foothills, have been intimated previously. Robert F. Hoover, who collected *L. dichotoma* in the Great Central Valley and Sierran foothills in 1937, 1938, and 1939, identified his 1946 collection of *L. dichotoma sensu* Keck (1959) from the Diablo Range (Hoover 6098, CAS 457623, UC 285370, UC 771656) to genus only, with the following parenthetical note added in his hand to CAS 457623 and UC 285370: "referred to *L. dichotoma* by Keck—needs more study." Rimo Bacigalupi called attention to the glandulosity of plants from the Diablo Range in an annotation (11 Mar 1958) of Hoover's collection (UC 771656). Baldwin and Strother (2006) noted that plants of *L. dichotoma* from the Inner South Coast Ranges "... are notably stipitate-glandular, unlike most Sierran and San Joaquin Valley collections." (Note: Their reference to the San Joaquin Valley rather than the Great Central Valley in general reflects the absence of any known collections of *L. dichotoma sensu* Keck [1959] from the Sacramento Valley [or anywhere north of Knights Ferry, Stanislaus Co.] since the 19th Century).

Morphological comparisons of additional specimens, including field collections from 2010 and 2011, have demonstrated that plants of *L. dichotoma sensu* Keck (1959) from the Diablo Range differ from plants elsewhere in the range of the species in vegetative and reproductive characters (see below). Phylogenetic analyses of nuclear ribosomal DNA and chloroplast DNA sequences of *Lagophylla*, including representatives of populations sampled across the distribution of each currently recognized species, have provided two lines of molecular evidence for a closer relationship of *L. dichotoma sensu* Keck (1959) from the Diablo Range to *L. ramosissima* than to *L. dichotoma sensu* Keck (1959) from the San Joaquin Valley and Sierran foothills (B. G. Baldwin unpublished). Examination of a probable isotype (fragmentary) of *L. dichotoma* (Hartweg 1793, GH 9562) and a photograph (UC 202612) of the holotype at Kew indicate that the species recognized here for the Great Central Valley and Sierra Nevada foothill populations should bear that name. A new name is needed for the species recognized here for plants of the southern Diablo Range, described below.

TAXONOMY

Lagophylla diabolensis B. G. Baldwin, sp. nov. (Fig. 1).—TYPE: USA, California, San Benito Co., 4.1 mi SE of junction with State Highway 25 along Coalinga Road, in foothill woodland, 21 May 1988, B. G. Baldwin 701 (holotype: JEPS; isotypes: CAS, DAV).

Annuals, to 1 m high, foliage pale-green, aromatic; **stems** usually uniformly tawny (rarely distally purplish), sparsely strigose to hirsute, also sparsely stalked-glandular distally, glands clear to dark purple; **cauline leaves** mostly alternate (proximally opposite), sessile, 1–5 cm long, 1–5 mm wide, linear to lance-linear or oblance-linear, entire, sparsely long-ciliate proximally, faces strigose-hirsute, hairs shorter abaxially; **basal leaves** withered at flowering; **capitulescence** paniculiform, to 40 cm wide, with dominant central stem slightly zig-zag, branches ascending, ultimate branchlets filiform; **calycular-like bracts** 2–3, elliptic to elliptic-oblongate, each 5–6 (–11) mm long, overtopping body of involucre, exceeded by phyllary tips or not, coarsely ciliate (hairs to 1.5 mm long), hirsutulous and abaxially stalked-glandular, glands clear to dark purple; **heads** radiate; **involucre** obconic-hemispheric, ca. 5 mm diam; **phyllaries** 5, each completely enfolding a ray ovary (margins of phyllary body connivent, minutely ciliate) and falling with fruit, 4–5 mm long (body usually 2.5–3 mm long; free tip 1.5–2 mm long), lance-linear, body ca. 1.5 mm side-to-side, 1 mm front-to-back, hirsute (hairs ascending), at least near folded edge, to hirsutulous, and stalked-glandular (glands clear to dark-purple), tip straight; **receptacles** bristly at center, paleae in 1 peripheral series, usually 5, 3.5–5 mm long, alternating with phyllaries, free, each partially clasping a disk corolla, herbaceous except for hyaline margins of clasping portion, puberulent, tip \pm erect, ca. 1 mm; **ray florets** 5, pistillate, corolla bristly-hirsute in proximal third abaxially and proximal to lobes adaxially, tube 0.5–1 mm long, laminae 4–9 mm long, broadly obovate-obdeltate, light yellow except for purplish main veins abaxially on lobes, at least distally, lobes 3, 1/3–1/2 length of laminae, creased (and folding inwardly, especially under heat or drought stress) along main veins, lateral lobes 1.5–3 mm wide, central lobe 0.5–1.5 mm wide; **disc florets** 6 (5 peripheral, alternating with ray florets, and 1 central, 1 mm longer than others), functionally staminate (ovary sterile), corollas yellow, 2.5–3 mm long, narrowly funnelform, tube/throat 2–2.5 mm long, sparsely bristly near base, lobes 5, spreading to reflexed, 0.5–0.75 mm long, ovate-deltate, adaxially papillate; anthers dark purple, appendages ovate-deltate; ovaries 0.5–1.75 mm (ovary of central disk floret 1 mm longer than ovaries of peripheral disk florets), glabrous, style branches erect, fused throughout length, densely bristly-puberulent, pappus absent; (ray) **cypselae** 2.3–3 mm long, oblanceolate to obovate in outline, obcompressed (1.0–1.7 mm side-to-side; 0.6–1 mm front-to-back), slightly arched outwardly, black with irregular brown mottling or crust, finely striate, glabrous, pappus 0. Chromosome number $2n = 7_{II}$ (Johansen 1933; Thompson 1983).

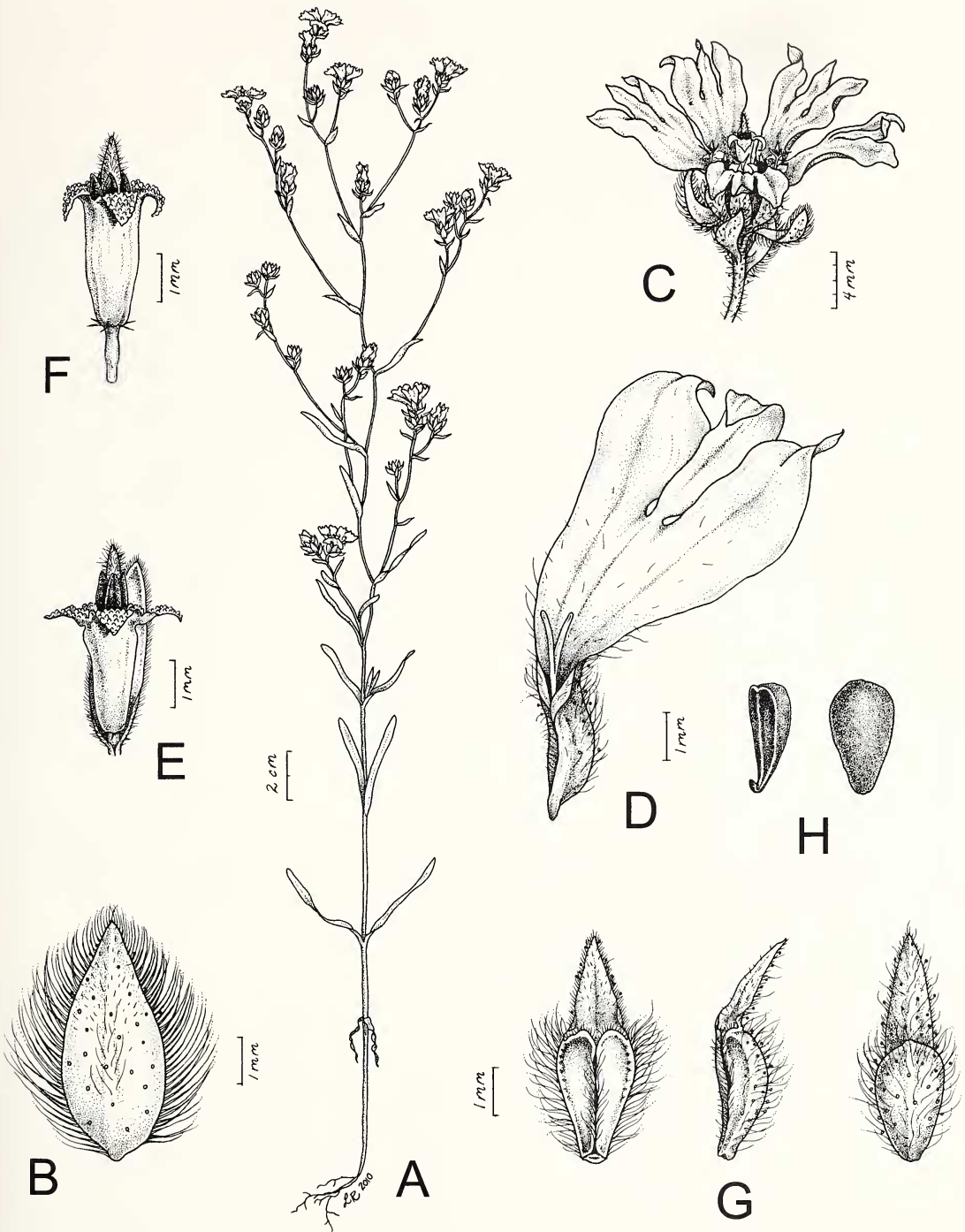


FIG. 1. *Lagophylla diabolensis*. A. Habit. B. Calycular-like bract. C. Head. D. Ray floret and associated (clasping) phyllary. E. Disc floret and associated palea. F. Disc floret. G. Phyllary clasping cypsela in (left-to-right) adaxial, obliquely lateral, and abaxial views. H. Cypsela in (left-to-right) obliquely lateral and abaxial views.

Paratypes

USA, California: Fresno Co., near eastern base of Coalinga-Parkfield grade, 12 Jun 1915, *H. M. Hall 10028* (DS 635069, DS 188348, GH).

Monterey Co., 15 mi N of San Miguel, in Indian Valley, 1200 ft elev., 27 Apr 1934, *D. D. Keck 2844* (CAS, DS 635073, DS 328347, GH, UC); between Black Mountain and Mustang Peak, 3500 ft, 26 Jun 1964, *C. B. Hardham 18,142*

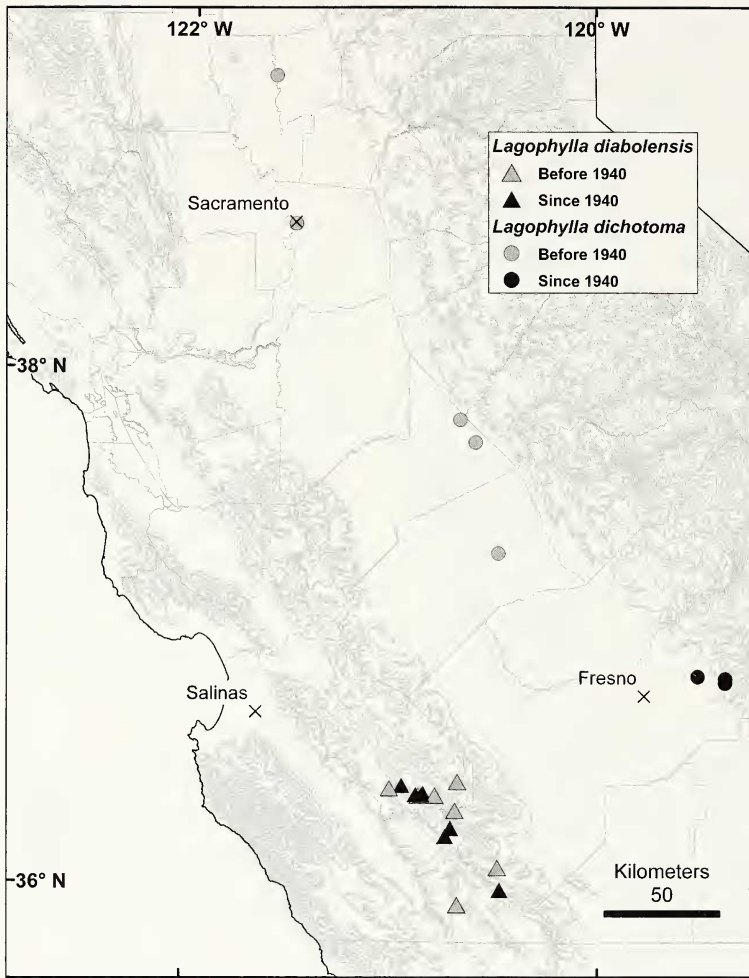


FIG. 2. Geographic distribution of *Lagophylla diabolensis* and *L. dichotoma* based on herbarium records. Note the paucity of occurrences for both species, especially based on documented collections since 1940 (see text).

(CAS); Mustang Grade, 12 Jun 1938, *A. Eastwood* and *J. T. Howell* 5821 (CAS, DS); Hwy 198, ½ mi W of mile marker #22, 31 May 1982, *V. Yadon* H-2214 (PGM). San Benito Co., North Fork Road, near Le Neve Ranch, 3.5 mi N of Priest Valley School, 1 Jul 1982, *V. Yadon* H-2491 (PGM); 1.5 mi from junction of San Benito-Hernandez road on cross-road to Bitterwater Valley, 2000 ft elev., 1 May 1933, *D. D. Keck* 2052 (DS); San Benito Valley, 19.6 mi from King City (in pencil), 10 Jun 1931, *H. M. Hall* 13158 (DS); Lorenzo Creek, 2400 ft elev., 2 Jun 1927, *W. L. Jepson* 12,221 (JEPS); Coalinga Road, about 4 mi N of Clear Creek Road, 4 Jun 1962, *V. F. Hesse* 3146 (JEPS, UC); same locality as holotype (*BGB* 701), 36.39896°N, 120.94571°W, 1850 ft elev., 27 Jun 2010, *B. G. Baldwin* 1543 (JEPS); Coalinga Road, 9.45 mi SE of California State Highway 25, 36.36368°N, 120.87760°W, 2200 ft elev., 27 Jun 2010, *B. G. Baldwin* 1542 (JEPS); first ridge on Hernandez road after

leaving Hollister-King City road, 31 May 1946, *R. F. Hoover* 6098 (CAS, UC 285370, UC 771656); Coalinga Road, at summit 11.4 mi SE of junction with California State Highway 25, 21 May 1988, *B. G. Baldwin* 702 (CAS, DAV); same locality as *BGB* 702, 36.35965°N, 120.84891°W, 2900 ft elev., 26 Apr 2011, *B. G. Baldwin* 1566 (JEPS); Hernandez, 17 May 1893, *A. Eastwood* s.n. (UC 89193) [note: label indicates Warthen, 11 May 1893; annotation by *A. Eastwood* indicates locality and date given here]; near Hernandez, San Benito Co., 17 Aug 1933, *J. T. Howell* 11545 (CAS, DS); near Harrisons, Hernandez, San Benito Co., 1 Jun 1899, *W. R. Dudley* s.n. (DS 3514); upper San Benito River, 2900 ft elev., 1 Jun 1927, *W. L. Jepson* 12,203 (JEPS); above New Idria, San Benito Co., 31 May 1899, *W. R. Dudley* s.n. (DS3365).

Lagophylla diabolensis differs from *L. dichotoma* in the narrow sense by its consistently stalked-glandular (versus often eglandular) distal

foliage, linear to lance- or oblance-linear (versus oblanceolate to spatulate) and entire (versus entire to toothed) leaves, generally uniformly tawny (versus tawny to dark purplish) stems; and smaller heads, with phyllaries 4–5 mm (versus 6–6.5 mm) long, ray laminae 4–9 mm (versus 4–13 mm) long, and disc corollas 2.5–3 mm (versus 4 mm) long.

Lagophylla diabolensis is known from southwestern Fresno, southeastern Monterey, and southern San Benito counties, generally in dense clay soils of grassy openings in foothill woodland, from about 350 to 1070 m elev. (Fig. 2). One collection with minimal and uncertain label information (Tulare County, Apr 1900, *D. G. B. [?] s.n.* [DS 3366]) is a geographic outlier of doubtful provenance. Flowering is mainly from late April to early July, with last heads sometimes produced as late as August (in contrast to documented flowering of *L. dichotoma sensu stricto* (*s.s.*) from early April to mid May). Woody associates include *Pinus sabiniana* D. Don, *Quercus douglasii* Hook. & Arn., *Q. lobata* Née, and *Toxicodendron diversilobum* (Torr. & A. Gray) Greene. Associated native forbs and grasses include taxa of *Achillea* L., *Achyrrachaena* Schauer, *Agoseris* Raf., *Corethrogyne* DC., *Clarkia* Pursh, *Delphinium* L., *Lupinus* L., *Madia* Molina, and *Poa* L. Non-native associates include species of *Avena* L., *Bromus* L., *Centaurea* L., *Elymus* L. (*Taeniatherum* Nevski), and *Lactuca* L.

Etymology

Apparent restriction of *L. diabolensis* to the Diablo Range is the basis for the species epithet.

Conservation Status

Keck (1935), in reference to the taxon he then treated as *L. dichotoma* subsp. *dichotoma* (= *L. dichotoma sensu* Keck [1959]), which comprised plants treated here as *L. diabolensis* and *L. dichotoma*, noted that “(t)his is one of the very rare tarweeds.” Persistent paucity of herbarium collections and known localities for plants belonging to *L. diabolensis* and *L. dichotoma s.s.* is consistent with the extreme rarity of both species (Fig. 2). Lack of collections of *L. diabolensis* (and *L. dichotoma s.s.*) may in part reflect year-to-year variation in emergence of plants, inconspicuousness of plants when heads are closed in the afternoon in response to heat or drought stress (Thompson 1983), and inaccessibility of extensive private land near known collection areas, where undocumented populations may occur.

Lagophylla dichotoma, already listed by the California Native Plant Society (2012) as rare, threatened, and endangered in California and elsewhere (California Rare Plant Rank 1B.1), is

here recognized as a much rarer species, with only five general occurrences known to me outside the Sacramento Valley, where evidently no collection of *L. dichotoma* has been made since the 19th Century (Fig. 2). Early, Sacramento Valley records are vague or general as to locality: “along the Feather River north to Chico (?) or beyond” (13–? 16 Apr 1847) for a large set of specimens including Hartweg’s type collection (fide McVaugh 1970); “plains of Feather River near Marysville” (May, no year given; *Bigelow s.n.*, GH 9563); and “Sacramento” for an undated, fragmentary collection (*Fitch s.n.*, GH) in a packet on the same sheet as the putative isotype and Bigelow specimens. For three of the five general occurrences for *L. dichotoma s.s.* south of the Sacramento Valley, I know only of collections made from 1915 to 1939, from Merced (23 Apr 1915, *Eastwood 4431*, CAS, UC), in Merced Co., and from Knights Ferry (4 May 1937, *Hoover 2040*, DS, JEPS, UC; 9 May 1938, *Hoover 3377*, JEPS, UC) and Warnerville (4 May 1937, *Hoover 2050*, CAS, DS 318633, DS 635059, DS 253131, JEPS, UC), in Stanislaus Co. The other two general localities, where plants were documented historically and recently, are both in Fresno Co., at Round Mountain (31 May 1946, *Carter 89*, DS, UC; 24 Apr 2010, *Baldwin et al. 1539*, JEPS) and Tivy Mountain (10 Apr 1939 [“Piedra”], *Hoover 3982*, CAS, DS 318632, DS 635068, DS 266092, JEPS, UC; 21 Apr 2001, *Greenhouse and Greenhouse 5015*, JEPS; 24 Apr 2010, *Baldwin et al. 1533, 1536*, JEPS), where the Sierra Foothill Conservancy’s Tivy Mountain Preserve and any conservation efforts directed toward the population on Round Mountain may be key to survival of *L. dichotoma*.

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